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ABSTRACT

One of the most serious problems associated with aging concerns the decline in perceptual-motor skills, due to illness and/or lack of use based on poor motivation. Investigations of training programs to improve hand-eye coordination have yielded mixed results. A study was conducted to examine the effects of a training program to improve hand-eye coordination using an arcade video game with noninstitutionalized older men (N=2) and women (N=9). A limited control group of one man and one woman was included. All subjects completed a battery of instruments which included the Wechsler Adult Intelligence Scale-Revised (WAIS-R), the Rotary Pursuit, the Purdue Pegboard, and the Senior Level of Functioning Test. For 2 months experimental subjects participated in twice weekly training sessions on the Atari video game "Crystal Castles." Following the training period, all subjects completed posttests of the original battery of instruments. The results indicated that the experimental group demonstrated significant improvement in scores on the video game, the Rotary Pursuit, and the Purdue Pegboard. The experimental group's improvement on the WAIS-R full scale and the Verbal and Performance subtests also proved significant. Neither control subject showed improvements on any of the measures. In addition, experimental subjects reported improved coordination, better driving habits, and fewer minor mishaps at home. (NRB)

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Video games: utilization of a novel strategy to improve perceptual-motor skills in the non-institutionalized elderly

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ABSTRACT

One of the most serious problems associated with aging concerns the decline in perceptual-motor skills. The deterioration may be due to illness and/or lack of use based on poor motivation. Investigations of training programs to improve hand-eye coordination have yielded mixed results. Those that were successful utilized highly motivating tasks such as Dance Therapy. The authors observed the fascination that video games held for their students which suggested that these games could be used in a training program to improve perceptual motor skills in the elderly. It was hypothesized that non-institutionalized older men and women would exhibit improvement on the games that would, in turn, generalize to scores on a standardized battery of tests (e.g. WAIS-R, Purdue Pegboard, Rotary Pursuit) and a measure of quality of life. Eleven elderly volunteers (9 women, 2 men) served as the experimental group. One man and one woman acted as a limited control group. The size of the sample was restricted by the grant. Subjects were pretested on the battery, exposed to two months of training and tested again on the battery. All experimental subjects showed significant improvement on all measures. The controls did not change. Suggestions are made for further research including the obvious need to expand the total subject sample and redress the imbalance of males to females.

Video games: utilization of a novel strategy to improve perceptual-motor skills in the non-institutionalized elderly

The stereotype of the elderly in our society has generally classified them as being emotionally dependent, relatively helpless and in need of expensive special care. Certainly, we recognize that many of the elderly do not fit the stereotype. These people are, nevertheless, treated as the exception rather than the rule. One major consequence of accepting the prevailing stereotype is that a sizeable number of older people are prematurely relegated to spending the remaining years of their lives in homes for the aged. Unfortunately, some of these institutions are notorious for being ill equipped inadequately staffed buildings, where privacy and human dignity are ignored (Eisdorfer, 1983). Another serious consequence is that tranquilizers instead of curative procedures may be prescribed for complaints that are dismissed as psychological in origin when the patients are really suffering from treatable physical disorders. Thus, the cost of prolonged care for people considered too old to provide a reasonable return for expenses incurred on their behalf is saved (Tolliver, 1983). In general, the utilization of a strict cost/benefit approach to solving the problems of aging has had a negative impact on the development of new therapeutic strategies and on economic policies concerning employment. (Amoss and Harrell, 1981) The elderly are discouraged from full participation in decision making processes concerning their future. Mandatory retirement prevents them from contributing to the economic well being of the nation even when they are capable. This situation creates severe financial problems for many. The attitudes of young and old alike indicate that both groups think a large percentage of the aging are incapable of "putting in a full day's work" and are "not worth their salaries" (Drew and Waters, 1984). One component of the

aging process closely related to the ability to work is deteriorating hand-eye coordination. Early retirement is usually encouraged in professions requiring a high level of perceptual-motor skill.

In the past, unidimensional views about the elderly have often led to practices on the part of professionals and the public alike that reinforced dysfunctional models and tended to "perpetuate a mythology of aging to the detriment of all involved" (Eisdorfer, 1983). Once can, however, err too far in the opposite direction. In the effort to dispel myths concerning the aging process, it sometimes seems as if there are no real disabilities that can be linked to age. The danger in such a tactic is that policy makers may be confused about the realistic needs of all segments of the elderly population. Birren (1983) points out that aging can be viewed in more than one way. There is the pessimistic philosophy that we have already delineated, which focuses on "the large number of poor, unhealthy and lonely older adults." For a considerable time in the future we can, in fact, expect an increase in the number of chronically ill older people in this country. A more optimistic perspective emphasizes the millions of competent older persons who will be able to enjoy a full life. However, even these people face problems that must be solved.

At the present time, the proportion of people over 65 years of age exceeds the number of adolescents in the United States. The issues of decline in general health status and specific functioning along with economic problems are a major influence on perceived quality of life. The incidence of impairment due either to injury and/or chronic illness does increase with age. In a national survey (Kimmel, 1974), three fourths of all respondents over 65 reported that they suffered from one or more types of disability. Some of these disabilities may be totally incapacitating, others may only partially hinder functioning. Some disorders may be treatable by today's

methods, while others await new discoveries in medicine. In the case of perceptual-motor skills, the decrements may be a result of illness and/or infrequent exercise due to lack of motivation. In any event, a decline in the range of physical abilities seriously affects all aspects of daily life. Difficulties in hand-eye coordination may severely reduce the ability to earn a living or supplement retirement benefits and, at the same time, may increase the need for costly household care. Thus, perceptual-motor problems can constitute a major crisis for people on a fixed and often inadequate income. Furthermore, the personal sense of loss can contribute to the tendency on the part of some elderly people to withdraw from social contacts.

It becomes clear then, that any method for improving hand-eye coordination or for slowing deterioration could be of value to countless numbers of the elderly and, perhaps, to physically handicapped younger people as well. Many training programs designed to increase activity levels or improve perceptual-motor functioning fail in the long run because the tasks are boring and the patients lose their incentive to continue practicing. A search of the literature concerning improvement of motor performance in the elderly yielded mixed results (Gilmore, Royer and Gruhn, 1983; Perone and Baron, 1982; Haywood, 1982). Studies that did produce positive findings usually involved such highly motivating activities as Dance Therapy (Fersh, 1981).

It seemed to us, having observed the fascination that arcade video games had for young people, that these games might be useful for improving perceptual-motor skills in the elderly. Sedlak, Doyle and Schloss (1982) had already reported some success in a video game training program for severely retarded adolescents. Moreover, the number of sales of home video games and the past popularity of arcades, while presently on the decline, indicated that playing video games could still be motivating even when the novelty

effect wore off. We realized, however, that all games were "not created equal" and some would be better for a training program than others, essentially because of differences in speed.

While we were interested to see if we could demonstrate improvement on the video game itself, we also planned to relate the results to scores on a whole battery of standardized instruments. In addition, we hoped that positive results from a training program would influence perceived quality of life.

Design Considerations

Having worked with older subjects before (Drew and Waters, 1984; Waters and Drew, 1984), we were aware of potential problems due to evaluation apprehension. Despite the observation that playing video games can be almost addictive for some children and adolescents, we felt that there was a good possibility that elderly people might be anxious about their performance in comparison with the skill of many younger people and wary of a task that seemed to be almost exclusively in the province of the young and, therefore, not an "appropriate" activity of a mature, dignified person. We knew we would need to spend time with subjects to overcome these feelings. Past experience had convinced us that in designing any program for the elderly, a considerable amount of time would also have to be allocated to establish rapport with people who are not accustomed to being experimental subjects. Students who are being trained in testing procedures or in research design using their peers as subjects are not always aware of the seriousness of this problem. Community psychologists have learned that agencies, for example, usually want a return for their involvement with a project. Long range outcomes that will contribute to the body of knowledge in science are not always impressive arguments for giving up one's time. In the training program that we designed, it could be argued that the perceptual-motor skills

of the subjects would be improved and that possibility should be sufficient reward for participation. Of course, since this was to be a new investigation, we had no hard evidence for our contention, only our own hypotheses. We alloted double the amount of time for each training session to cover the psychological needs of the subjects.

The selection of subjects and the site for the project were important considerations. We rejected the possibility of setting up the program at the University because that would have required the subjects to travel to keep their appointments. We examined the idea of using a home for the aged, but that alternative was also rejected for two reasons. First, the patients might be too debilitated to participate in a long training program and second, many might be using medication that would interfere with their functioning. In the end, we chose a residence for "seniors" who were physically capable of caring for most of their own needs.

Hypotheses

We predicted that the subjects would benefit from a training program to improve hand-eye coordination utilizing an arcade video game. We further hypothesized that positive results on the game would generalize to scores on a battery of standardized tests and to perceived quality of life.

Method

The study was a pretest-posttest design with a limited control group.

Subjects. Three men and ten women residing in an apartment house complex for senior citizens in Northwest New Jersey volunteered to participate in the project. Budget constraints governed the number of people in the study. Nine women and two men were assigned to the experimental condition. One man and one woman acted as controls. The age range was 61 to 78 years. Subjects suffered from a variety of disorders including arthritis and some visual disabilities. None, however, was so handicapped that he or she could not reasonably participate in the study.

Apparatus. An arcade video game called Crystal Castles supplied by the Atari Adventure Corporation was selected for the project. The advantage of the game is that it has several levels of difficulty. The lowest level was deemed sufficiently easy so that the participants were not subjected to a task beyond their initial capabilities. The object of the game is to control a little bear so that he can collect as many "gemstones" as possible before being destroyed by one of the numerous "hazards" that appears on the display. The action of the bear is controlled by a ball that is manipulated with the fingers. The advantage of the ball is that it requires fine finger movements more than a "joystick" does.

The battery of testing instruments included a Rotary Pursuit from Lafayette Instruments (Model 30010) and a Purdue Pegboard.

Subjects were also tested on the WAIS-R. Perceived quality of life was measured by the Senior Level of Functioning Test (SLOF), an abbreviated form of the OARS methodology devised by Nussbaum (unpublished Master's Thesis, 1980).

Procedure. All subjects (experimental and control group) were first tested on the battery of instruments. Then the experimental group was given two months of training on the video game twice a week for a period of one half hour of actual practice (a full hour with the experimenters). At the end of the training period, all subjects were tested again. The experimenters spent time with the controls every week so as to minimize the influence of the Hawthorne Effect.

During the first five sessions of training, all experimental subjects were given the opportunity to familiarize themselves with the game. Comparisons were made between the scores of the sixth and fifteenth sessions on the video game and between the pretest and posttest scores on the WAIS-R, the Rotary Pursuit, the Purdue Pegboard and the SLOF.

All subjects were asked not to play any video games outside of the experimental situation and agreed to cooperate.

Results

1. As hypothesized, the experimental group demonstrated significant improvement in scores on the video game, the Rotary Pursuit and the Purdue Pegboard (See Tables 1 and 2).

TABLE 1

Mean scores and standard deviations on all measures for all subjects (N=11).

Instrument	Pretest	Posttest
WAIS-R (full scale):		
mean	101.82	108.27
s.d.	7.37	7.11
verbal mean	102.00	106.09
s.d.	7.98	10.00
performance mean	99.27	108.54
s.d.	13.37	8.65
Purdue Pegboard:		
mean	10.61	11.94
s.d.	1.46	1.13
Rotary Pursuit:		
mean	57.85	71.93
s.d.	22.58	16.87
Video Game:		
mean	15530.19	23797.98
s.d.	5791.72	8577.89
Game Duration:		
mean	110.03 sec.	136.40 sec.
s.d.	32.86 sec.	42.67 sec.

TABLE 2

The results of t tests for all subjects on battery and the video game scores.

Instrument	t
WAIS-R (full scale)	4.48**
verbal	3.20*
Performance	2.62*
Purdue Pegboard	3.51**
Rotary Pursuit	3.83**
Video Game Score	6.68**
Game Duration	4.03**

* p less than .05
**p less than .01

Not only did the scores of the subjects increase, but they were able to play each game for a longer period of time thus further indicating a positive change in level of skill.

2. The differences on the WAIS-R full scale and the Verbal and Performance subtests also proved significant (See Table 2).

3. It seemed reasonable, given the predominance of women in the sample, to analyze the data using only female subjects. The results were almost the same (See Tables 3 and 4).

TABLE 3

Mean scores and standard deviations on all measures for female subjects only (N=9).

Instrument		Pretest	Posttest
WAIS-R (full scale):			
	mean	100.33	105.78
	s.d.	6.90	8.43
verbal	mean	100.56	104.44
	s.d.	7.34	9.74
performance	mean	97.44	108.00
	s.d.	14.09	9.46
Purdue Pegboard:			
	mean	10.56	12.00
	s.d.	1.60	1.23
Rotary Pursuit:			
	mean	53.04	70.20
	s.d.	22.19	17.48
Video Game:			
	mean	15093.00	22787.68
	s.d.	6305.49	9104.20
Game Duration:			
	mean	108.02 sec.	134.40 sec.
	s.d.	34.10 sec.	46.93 sec.

TABLE 4

The results of the t tests for female subjects only on the pre- posttest battery and the video game.

Instrument	t
WAIS-R (full scale)	3.70**
verbal	2.50*
Performance	2.53*
Purdue Pegboard	3.28*
Rotary Pursuit	4.73**
Video Game Score	5.41**
Game Duration	3.87**

* p less than .05
**p less than .01

4. Neither of the controls showed improvement on any of the measures.

5. The results of the scoring of the SLOF indicate that six experimental subjects showed improvement in perceived quality of life, one remained the same and four went down. Both controls went down. The changes were minimal and reflected financial problems, not perceptions of their general state of health.

In the debriefing, however, the experimental subjects reported improved coordination, better driving habits and fewer minor mishaps in the home.

Summary

The hypothesis concerning the improvement in perceptual motor performance on the video game was strongly supported. Moreover, as predicted, the results did generalize to the other measures including the SLOF.

Discussion

Despite the small size of the sample, given the results of the program, we are very encouraged and optimistic about the possibility of improving perceptual-motor performance in elderly people. There is no doubt that improvement occurred, but accounting for the change is not easy. Much of our interpretation is based on three sources: the significant change in the scores, our own observations of the progress of the experimental group and the data collected during the debriefing.

In order to achieve the improvement in scores and increase in duration of play per game indicated by the data, subjects had to manipulate the protagonist skillfully enough to collect gemstones while avoiding hazards that would end the game. It was obvious that manual dexterity improved. It was also obvious that subjects were now attending to peripheral cues that indicated hostile elements about to attack the protagonist. Thus, over time, subjects exhibited greater "perceptual vigilance" in playing the game. After the project ended, subjects informed us that they had become more careful in their daily activities such as driving and had fewer household mishaps.

Concerning the issue of manual dexterity, some of the women in the study reported that they were returning to hobbies such as knitting that they had given up. Others simply stated that they were engaging in more tasks around the house than they had attempted in years.

We also suggest that the subjects developed improved cognitive strategies for playing the game. In order to increase their overall scores, they had to attend more closely to peripheral cues and decide whether it would be more advantageous at any particular moment to collect gemstones or to avoid the approaching hazard that could end the game.

It is clear that we have many issues to resolve at this point. Certainly, we need a larger sample to study, especially male subjects. We would also like to track the process of a new group of elderly people and contrast their data with those of a comparable younger group.

REFERENCES

Amoss, P. and Harrell, S. (1981). Introduction: an anthropological perspective on aging. In P. Amoss and S. Harrell (eds.), Other Ways of Growing Old. Stanford: Stanford University Press.

Birren, J. (1983). Aging in America: roles for psychology. American Psychologist, 38 (3), 298-299.

Drew, B. and Waters, J. (1984). Perceptions of job competence in older workers. Paper presented at the Eastern Psychological Association, Boston.

Eisdorfer, C. (1983). Conceptual models of aging: the challenge of a new frontier. American Psychologist, 38, 197-202.

Fersh, I. (1981). Dance/movement therapy: a holistic approach to working with the elderly. Activities, Adaptation and Aging, 2 (1), 21-30.

Gilmore, G., Royer, F. and Gruhn, J. (1983). Age differences in digit symbol substitution task performance. Journal of Clinical Psychology, 39 (1), 114-124.

Haywood, K. (1982). Eye movements and accuracy during perceptual-motor performance in young and old adults. Experimental Aging Research 8 (3-4), 153-157.

Nussbaum, C. (1980). The Senior Level of Functioning Test. Unpublished Master's Thesis, Fairleigh Dickinson University, Madison Campus.

Perone, M. and Baron, A. (1982). Age related effects of pacing on acquisition and performance of response sequences: An operant analysis. Journal of Gerontology, 37 (4), 443-449.

Sedlak, R., Doyle, M. and Schloss, P. (1982). Video games: a training and generalization demonstration with severely retarded adolescents. Education and Training of the Mentally Retarded, 17 (4), 332-336.

Tolliver, L-M. (1983). Social and mental health needs of the aged. American Psychologist, 38, 316-318.

Waters, J. and Drew, B. (1984). Aging and sexuality: perceptions of a Puerto Rican sample. Paper presented at the Eastern Psychological Association, Boston.